NEWSLEAK

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Fall 2003

SC DHEC
Bureau of Water

Disinfection By-Products

Trihalomethanes and Haloacetic Acids

by Vivianne Vejdani, Drinking Water Compliance Monitoring

Total Trihalomethanes (TTHM) and Haloacetic Acids (HAA5) are disinfection by-products (DBPs). Disinfection by-products are formed when disinfectants such as chlorine combine with organic and/or inorganic matter present in drinking water. Some people who drink water for many years that contains DBPs in excess of the maximum contaminant level (MCL) may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

TTHMs and HAA5s are regulated under the *State Primary Drinking Water Regulation.* Large surface water systems (SWS) serving a population of greater than 10,000 persons have been monitored for TTHMs since 1979. These same systems have been monitored for HAA5s since January 1, 2002. Small SWS serving a population of less than 10,000 persons and all ground water systems (GWS) that add disinfection will be monitored for TTHMs and HAA5s beginning January 1, 2004.

"Monitoring for TTHM/HAA5 will be conducted by DHEC staff."

The MCL for TTHM is 0.080 mg/L, and the MCL for HAA5 is 0.060 mg/L. The frequency of monitoring will vary according to the number of treatment plants and the size of the population served by the water system. Monitoring will be conducted by DHEC staff. TTHM/HAA5 MCL violations require the water system to issue public notification within thirty days of the time that the system becomes aware of an exceedance. For information on controlling DBP levels within a water system, see the article ***Understanding Disinfection By-product Formation At Your Water System*** on page two of this newsletter.

System Types Defined

Type C - Community Water System

A public water system which serves at least fifteen service connections used by year-round residents or regularly serves at least twenty-five year-round residents. This may include, but is not limited to, subdivisions, municipalities, mobile home parks, and apartments.

Type N - Transient Noncommunity Water System

A public water system which serves at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least sixty days out of the year, and does not meet the definition of a community water system.

Type P - Nontransient Noncommunity Water System

A public water system that is not a community water system and that regularly serves at least twenty-five of the same persons over six months per year.

Type S - State Water System

Any water system that serves less than fifteen service connections or regularly serves an average of less than twenty-five individuals daily.

Upcoming Events

S.C. Rural Water Association Asbestos Training for Distribution, Collection and Contractor Personnel

December 3, 2003
Charleston, South Carolina
For more information, call
(864) 833-5566

S.C. AWWA Technology Transfer Conference

January 22 - 23, 2004
Greenville, South Carolina
For more information, call
(803) 540-1888

Inside this Issue

D H E C
PROMOTE PROTECT PROSPER
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Understanding Disinfection By-product Formation At Your Water System

by Greg McGlohorn, Drinking Water & Recreational Waters Compliance Section

The Stage 1 Disinfection By-product (DBP) Rule has already impacted several surface water systems around the state that serve > 10,000 customers. Smaller Community (type-C) and Nontransient Noncommunity (type-P) water systems that treat their water with a chemical disinfectant at any point in the treatment plant or distribution system must comply with the rule beginning January 1, 2004. State (type-S) and Transient Noncommunity (type-N) systems are exempt from the THM & HAA limits of the rule at this time. You can find definitions for system types on the first page of this newsletter.

Some surface water systems that have historically had low Trihalomethane (THM) concentrations discovered that their concentrations for the newly regulated Haloacetic acids (HAAs) were above the MCL of 0.060 mg/L. Other surface water systems that had been below the previous MCL of 0.100 mg/L for THMs now find themselves at or near the new MCL of 0.080 mg/L.

What are DBPs?

Unlike turbidity removal issues, which tend to be less plant specific and a bit more straight forward, DBP issues are extremely plant specific and they tend to be much more complex. In general terms, organic or inorganic material plus a chemical disinfectant results in the formation of DBPs.

Causes of DBPs

The extent of DBP formation can depend on multiple variables at the water treatment plant (WTP) or in the distribution system. These variables may include the type of disinfectant used, the disinfectant concentration, disinfectant application point, temperature, pH, contact time, source water characteristics, or Total Organic Carobon (TOC) removal efficiency. Changing any of these variables can potentially affect other treatment objectives such as disinfection, corrosion control, or iron & manganese control. Therefore, it is recommended that consulting engineers or qualified in-house technical staff conduct an engineering evaluation before any major changes in a surface water treatment plant's disinfection strategy are implemented. Major changes may include changing the type of disinfectant, changing the type of primary coagulant, changing the disinfectant application point, or reducing the disinfectant dose. However, there are some simple strategies that can be employed by operators in an effort to reduce or better understand THM and HAA formation at their respective plants.

Locating DBPs Formation

For any surface water system, the first and most important thing to understand is where the DBPs are being formed. By analyzing DBP concentrations in the plant's finished water and then comparing those results with distribution system results, the water system operator will be able to determine if most of the DBPs are being formed at the WTP or in the distribution system.

Distribution Formation

If the THM and HAA concentrations in the plant's finished water are relatively low, but the distribution results are high, then most of the DBPs are being formed in the distribution system.
In such cases, the water system's engineer may recommend more frequent flushing, storage tank modifications, booster chlorination, chlorination, or one of several other options in an effort to reduce DBP formation in the distribution system.

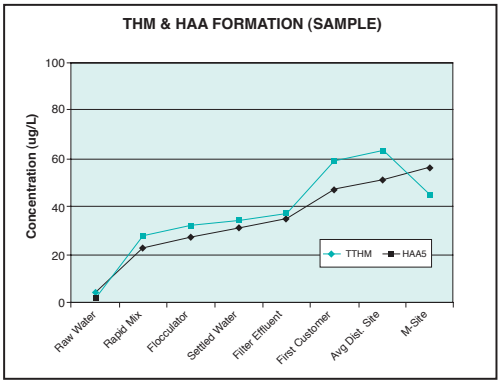
Plant Formation

High THM and HAA concentrations in the plant's finished water would indicate that significant DBP formation is occurring at the treatment plant. If most of the DBPs are being formed at the WTP, the next step might be to analyze DBP concentrations at various locations throughout the plant in order to determine where the DBPs are being formed. For example, THMs and HAAs can be sampled from the raw water, the rapid mix, the flocculators, the sedimentation basins, the filtered water, and then the finished water. Plotting these results in the form of a line graph (See Figure) will allow the operators and engineers to better understand where the DBPs are being formed and focus any DBP reduction efforts.

Summary

DBP sampling of the finished water and throughout the treatment plant, if needed, will allow water system managers, engineers, and operators to better understand where THMs and HAAs are being

continued on page 3 >>



DBP Formation

<< continued from page 2

formed in their system. Knowing where DBPs are being formed is the first step in developing a strategy for reducing their formation.

It is important to remember that there are many plant specific variables that can affect DBP formation. There are also many options available for the reduction of DBP formation. However, major changes involving a plant's disinfection strategy should not be attempted without first evaluating potential effects on other treatment objectives. A preliminary engineering report (PER) will evaluate potential options and their effects so that an informed decision can be made.

For more detailed questions about the Stage 1 DBP Rule, refer to the State Drinking Water Regulation, R.61-58.13 (www.scdhec.net/water/html/regs.html) or contact Greg McGlohorn at (803) 898-3480 or mcglohgb@dhec.sc.gov.

State Primary Drinking Water Regulation Revisions

EPA Continues to be Busy

During 2002 and 2003, EPA promulgated minor revisions to the Public Notification Rule, the Consumer Confidence Report Rule, and clarification of the National Primary Drinking Water Regulation for Arsenic. To maintain primary enforcement responsibility for the public water supervision program in South Carolina, the DHEC Bureau of Water must revise the State Primary Drinking Water Regulation to include regulations that are no less stringent than the federal EPA requirements. In accordance with federal requirements, the DHEC Board has approved the following revisions to the Drinking Water Regulation.

61-58.5(B)(2)

* Revises MCL for Arsenic (from 0.1 to 0.010 mg/l)

Appendix A to R.61-58.6

* Revisions under the heading "Microbiological Contaminants" for the Filter Backwash Recycling Rule

Appendix B to R.61-58.6

* Revises Standard Health Effects Language for Di(2-ethylhexyl)adipate and Di(2-ethlhexl)phthalate

* Revises MCL for Arsenic

Appendix D to R.61-58.12

* Additions under the heading "Inorganic Contaminants" for Bromate, Chloramines, Chlorine, Chlorine dioxide and Chlorite

* Revisions under the heading "Inorganic Contaminants" for Arsenic and Copper

* Revisions under the heading "Synthetic Organic Contaminants Including Pesticides and Herbicides" for Di(2-ethylhexyl) adipate and Di(2-ethlhexl)phthalate

* Revisions under the heading "Volatile Organic Contaminants" for TTHMs (Total Trihalomethanes)

* Deletions under the heading "Volatile Organic Contaminants" for Bromate, Chloramines, Chlorine, Chlorite and Chloride dioxide

Copies of the revisions may be obtained by contacting Valerie A. Betterton at (803) 898-4153 or betterva@dhec.sc.gov.

Standard Health Effects Language for Public Notification

by Vivianne Vejdani, Drinking Water Compliance Monitoring

Violations of the maximum contaminant level (MCL) for lead, copper, trihalomethane and haloacetic acids trigger a requirement that public notification be made within thirty days of the date the system becomes aware of the violation. The following standard health effects language for these contaminants must be included in any public notification.

- ***Total Trihalomethanes*** - Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

- ***Haloacetic Acids*** - Some people who drink water containing haloacetic acids in excess of the MCL over many years have an increased risk of getting cancer.

- ***Lead*** - Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

- ***Copper*** - Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

Total Organic Carbon

Compliance Calculations for Surface Water Systems

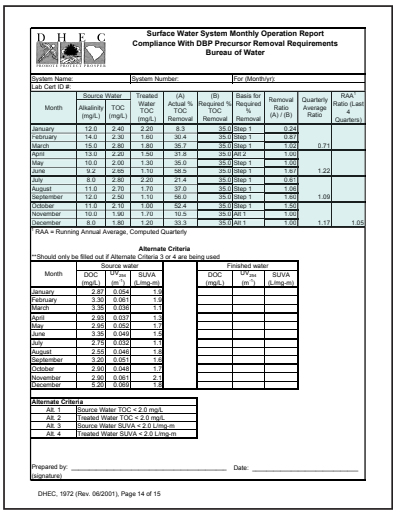
To determine your system's Total Organic Carbon Removal Ratio (TOC RR), all calculations will be based on **one (1)** decimal place for percentages (ACTUAL vs. REQUIRED) and **two (2)** decimal places for Removal Ratio (RR) calculations.

In an example from the table below, a source water TOC of 2.8 mg/L and a treated water TOC of 1.8 mg/L would yield a TOC removal of 35.7%. If the "required percent" removal for this example is 35.0%, then the removal ratio would be:

35.7 / 35.0 = 1.02

Note that all quarterly RR averages and the resulting Running Annual Average (RAA) should also be rounded to **two (2)** decimal places.

To calculate the RAA for the TOC Removal Ratio (TOC RR RAA), you must calculate the average of the previous four (4) complete consecutive quarters. Using the following example, when calculating the TOC RR RAA at the end of the first quarter 2003, the second, third and fourth quarter averages for 2002 are summed together with the first quarter average for 2003 and divided by four to give the TOC RR RAA.



D H E C

Surface Water System Monthly Operation Report
Compliance With DBP Precursor Removal Requirements
Bureau of Water

System Name: System Number: For (Month/yr):

Lab Cert ID #:

Month	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	(A) Actual % TOC Removal	(B) Required % TOC Removal	Basis for Required % Removal	Removal Ratio (A) / (B)	Quarterly Average Ratio	RAA[1] Ratio (Last 4 Quarters)
January	12.0	2.40	2.20	8.3	35.0	Step 1	0.24		
February	14.0	2.30	1.60	30.4	35.0	Step 1	0.87		
March	15.0	2.80	1.80	35.7	35.0	Step 1	1.02	0.71	
April	13.0	2.20	1.50	31.8	35.0	Alt 2	1.00		
May	10.0	2.00	1.30	35.0	35.0	Step 1	1.00		
June	9.2	2.65	1.10	58.5	35.0	Step 1	1.67	1.22	
July	8.0	2.80	2.20	21.4	35.0	Step 1	0.61		
August	11.0	2.70	1.70	37.0	35.0	Step 1	1.06		
September	12.0	2.50	1.10	58.0	35.0	Step 1	1.60	1.09	
October	11.0	2.10	1.00	52.4	35.0	Step 1	1.50		
November	10.0	1.90	1.70	10.5	35.0	Alt 1	1.00		
December	8.0	1.80	1.20	33.3	35.0	Alt 1	1.00	1.17	1.05

RAA = Running Annual Average, Computed Quarterly

Alternate Criteria

*Should only be filled out if Alternate Criteria 3 or 4 are being used

Month	Source water DOC (mg/L)	Source water UV_{254} (m^{-1})	Source water SUVA (L/mg-m)	Finished water DOC (mg/L)	Finished water UV_{254} (m^{-1})	Finished water SUVA (L/mg-m)
January	2.87	0.054	1.9			
February	3.30	0.061	1.8			
March	3.35	0.036	1.1			
April	2.93	0.037	1.3			
May	2.95	0.052	1.7			
June	3.35	0.049	1.5			
July	2.75	0.032	1.1			
August	2.55	0.046	1.8			
September	3.20	0.051	1.6			
October	2.90	0.048	1.7			
November	2.90	0.061	2.1			
December	5.20	0.069	1.3			

Alternate Criteria	
Alt. 1	Source Water TOC < 2.0 mg/L
Alt. 2	Treated Water TOC < 2.0 mg/L
Alt. 3	Source Water SUVA < 2.0 L/mg-m
Alt. 4	Treated Water SUVA < 2.0 L/mg-m

Prepared by: _____ Date: _____
(signature)

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Month	Source Water Alkalinity (mg/L)	Source Water TOC (mg/L)	Treated Water TOC (mg/L)	(A) Actual % TOC Removal	(B) Required % TOC Removal	Basis for Required % Removal	Removal Ratio (A) / (B)	Quarterly Average Ratio	RAA[1] Ratio (Last 4 Quarters)
January '03	12.0	2.40	2.20	8.3	35.0	Step 1	0.24		
February '03	14.0	2.30	1.60	30.4	35.0	Step 1	0.87		
March '03	15.0	2.80	1.80	35.7	35.0	Step 1	1.02	0.71	
April '02	13.0	2.20	1.50	31.8	35.0	Alt 2	1.00		
May '02	10.0	2.00	1.30	35.0	35.0	Step 1	1.00		
June '02	9.2	2.65	1.10	58.5	35.0	Step 1	1.67	1.22	
July '02	8.0	2.80	2.20	21.4	35.0	Step 1	0.61		
August '02	11.0	2.70	1.70	37.0	35.0	Step 1	1.06		
September '02	12.0	2.50	1.10	56.0	35.0	Step 1	1.60	1.09	
October '02	11.0	2.10	1.00	52.4	35.0	Step 1	1.50		
November '02	10.0	1.90	1.70	10.5	35.0	Alt 1	1.00		
December '02	8.0	1.80	1.20	33.3	35.0	Alt 1	1.00	1.17	1.05

Note: TOC and Specific Ultraviolet Absorption (SUVA) results are normally given by the lab as two or three significant digits. The lab method allows for 3 significant figures, but some labs round to 2 since the regulation is based on 2 significant figures. When completing the Monthly Operating Report, the TOC and SUVA should be rounded to 2 significant figures. Therefore, any alternative compliance calculations involving SUVA or TOC should also be given as 2 significant figures.

Water System Security Contact Information Request for Response

To facilitate more efficient communication of updated security information, *Newsleak* is soliciting you to provide us with your e-mail contact/address. Please e-mail or fax a contact name and e-mail address to Bill Randolph, State-Wide Coordinator for the Drinking Water System Security Program. E-mail randolws@dhec.sc.gov or fax to (803) 898-4215.

South Carolina Section of the American Water Works Association

by Shannon Lizewski, SCAWWA Advancement & Education Committee Chair

The American Water Works Association (AWWA) is the world's largest scientific and educational organization dedicated to drinking water quality and public drinking water supply. Through educational programs and scientific and technical information on improving the quality of the water we drink, the AWWA works for the health and welfare of the public.

Here in South Carolina, the AWWA is represented by the South Carolina Section of the American Water Works Association (SCAWWA). The SCAWWA promotes the mission of the AWWA by advancing technology, science, education and government policies relative to the water supply profession. This work is realized through the efforts of volunteers from among the members of the SCAWWA.

People are the heart of the SCAWWA. Members enjoy opportunities to share on-the-job experiences, link to related water resources, discuss local and national issues, discover new clients, and open the door to new job opportunities. Professionally, members make valuable contacts, enhance their resume, and increase their knowledge of the drinking water field. Personally, members can expect new friends, fun and personal growth.

Among the benefits of being an SCAWWA member are the many educational opportunities provided throughout the state. These training opportunities give managers, technical staff, and operators the necessary tools to continue to stay up-to-date on the growing number of issues within the water profession. Furthermore, all training can be used to complete continuing education unit requirements for certified engineers, water treatment and water distribution operators.

Water utilities also benefit from membership in the SCAWWA. Foremost is access to the Water Utility Council, a group of utility managers across the state who develop action plans to initiate, evaluate, respond, and comment on legislation and regulatory matters which directly affect water utilities.

More information on SCAWWA can be found by visiting *www.scawwa.org.*

Enforcement Division Report

During April 1, 2003 - June 30, 2003, the Enforcement Division issued 3 Consent Agreements, 51 Consent Orders, and 4 Administrative Orders. The Water Enforcement Division assessed approximately $442,057.00 during the second quarter of 2003.

More information about enforcement activities within DHEC may be found at www.scdhec.net/eqc/admin/html/eqcmain.html#Enforcement.

	*(CA)	(CO)	(AO)	(EO)
Agricultural Facilities				
Dams and Reservoirs				
Drinking Water		08	01	
Groundwater	03	02		
Recreational Waters		05	01	
Residential Wells		04	01	
Stormwater & Sediment Control		08	01	
Wastewater		24		

*Consent Agreement/Consent Order/Administrative Order/Emergency Order

SRF Funds Available

The State Revolving Fund (SRF) provides long-term loans to communities for construction of drinking water and clean water (wastewater) treatment and transmission facilities. Money is still available in both the Drinking Water and Clean Water (wastewater) SRF program. A share of these funds may await your drinking water or wastewater facilities project. **Loan interest rates for the upcoming fiscal year are expected to drop.** To submit a project questionnaire and get on the priority list, contact Tom McDonough at (803) 898-4038, or visit *www.scdhec.gov/water/html/srf.html.*

Bureau of Water Telephone Numbers

Main Telephone Number
(803) 898-4300

Main Fax Number
(803) 898-4215

EQC District Offices

APPALACHIA I ..... **(864) 260-5569**
Anderson, Oconee

APPALACHIA II ..... **(864) 241-1090**
Greenville, Pickens

APPALACHIA III ..... **(864) 596-3800**
Spartanburg, Cherokee, Union

CATAWBA ..... **(803) 285-7461**
Lancaster, Chester, York

CENTRAL MIDLANDS ..... **(803) 896-0620**
Richland, Lexington, Newberry, Fairfield

LOW COUNTRY ..... **(843) 846-1030**
Beaufort, Jasper, Colleton, Hampton

LOWER SAVANNAH ..... **(803) 641-7670**
Aiken, Orangeburg, Barnwell, Bamberg, Allendale, Calhoun

PEE DEE ..... **(843) 661-4825**
Florence, Dillon, Marion, Marlboro, Darlington, Chesterfield

TRIDENT ..... **(843) 740-1590**
Charleston, Berkeley, Dorchester

UPPER SAVANNAH ..... **(864) 223-0333**
Greenwood, Abbeville, Laurens, Saluda, Edgefield, McCormick

WACCAMAW ..... **(843) 448-1902**
Horry, Georgetown, Williamsburg

WATEREE ..... **(803) 778-1531**
Sumter, Kershaw, Lee, Clarendon

For Information Call . . .

Lead & Copper
Leslie Owens (803) 898-4149

Bacteriological Monitoring Program
Idris Liban (803) 898-3573

THM and SWTR compliance
Vivianne Vejdani (803) 898-4156

Radiological compliance
Patrick Metts (803) 898-3794

IOC, VOC, and SOC compliance
Wendi Smith (803) 898-3572

State Safe Drinking Water Act Fees
Susan Alder (803) 898-3554

Backflow Prevention and Cross Connection Control
John Watkins (803) 898-3567

Permitting of sources and treatment
Shawn Clarke (803) 898-3544

Permitting of water distribution lines
Wayne Stokes (803) 898-4159

Status of permit applications
Patty Barnes (803) 898-3550

Disinfectants/Disinfection By-product Rule
Doug Kinard (803) 898-3543

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